

Nigerian Dwarf Cluster Analysis Summary September, 2014

Data was obtained from the ADGA for 8 dairy breeds. All results were limited to those animals reported as Purebred (PB); however, all animals were included in the pedigree analysis to establish ties between animals, including cases where the ancestors are from another breed. Cluster analysis is a procedure that groups related animals based on pedigree relationship. This is a technique used by NAGP to assess where repository animals are grouping with the currently available genetic pool for each breed. It also establishes a practical approach for obtaining animals for the repository in a way that maximizes genetic diversity. Animals that were included in the cluster analysis included sires of PB offspring born 2010 to present that are also PB themselves.

Table 1 shows the summary statistics based on the pedigree and cluster analyses.

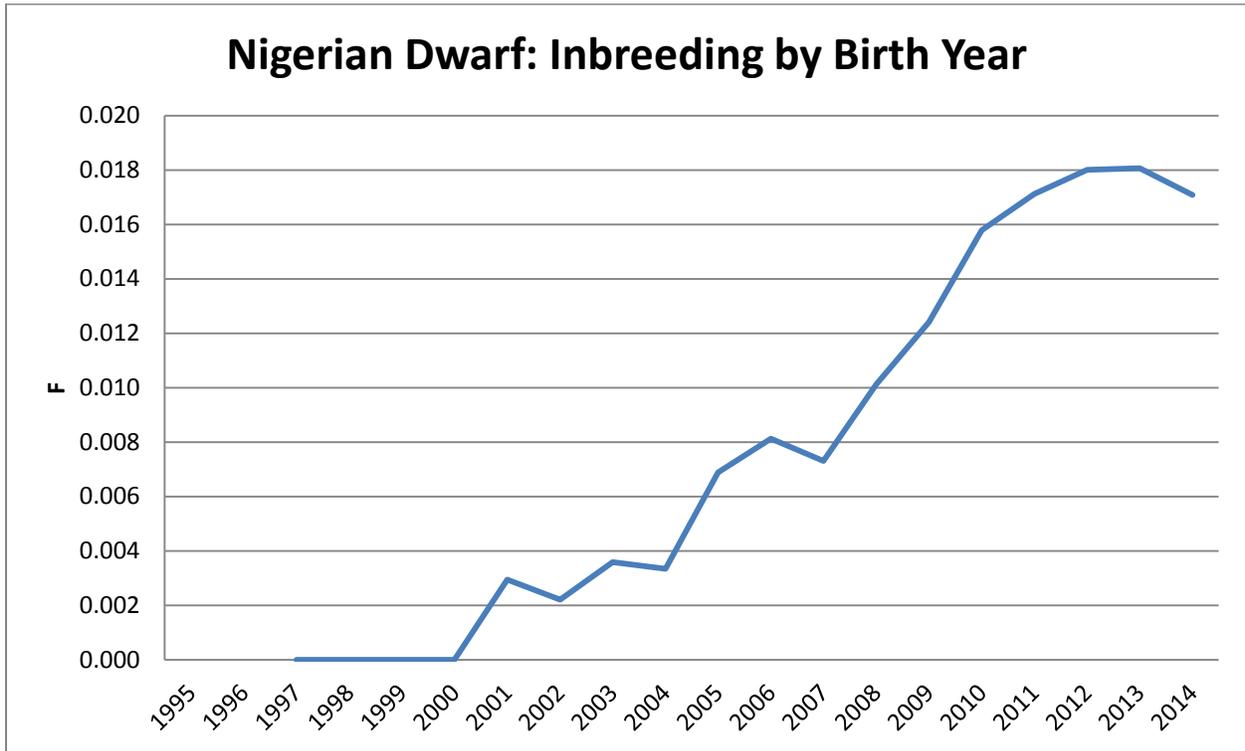
Table 1. Summary statistics for Nigerian Dwarf

	Nigerian Dwarf
Animals that are PB	37,164
Full pedigree file (until all ancestors are unknown)	39,432
Unique sires	4,589
Unique dams	11,791
Mean inbreeding (F)	0.014
F range	0 – 0.40
Repository bucks	0
Clustered bucks	3,390

Pedigree & Inbreeding Analysis

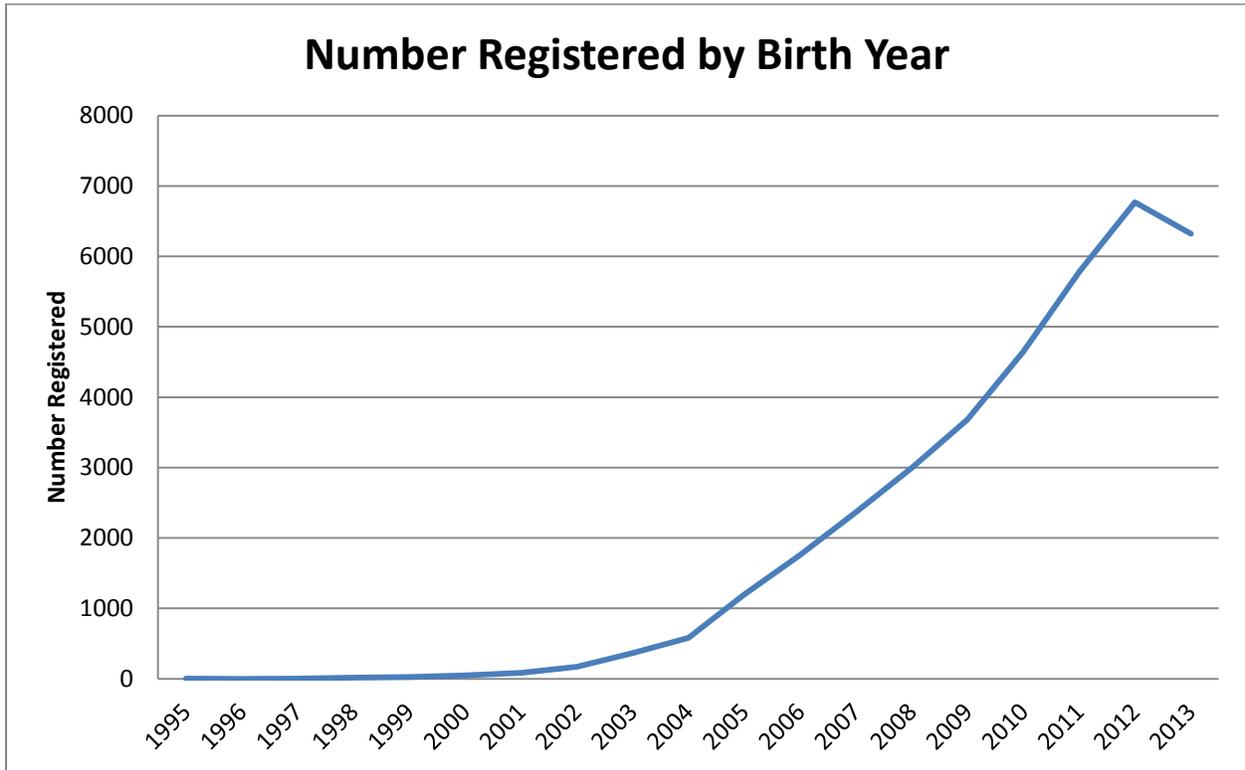
Figure 1 shows the inbreeding trend for Nigerian Dwarfs. With a much more shallow pedigree than the other dairy goat breeds, inbreeding has not had as much time to accumulate, leading to low overall inbreeding levels.

Figure 1. Nigerian Dwarf inbreeding trend by birth year



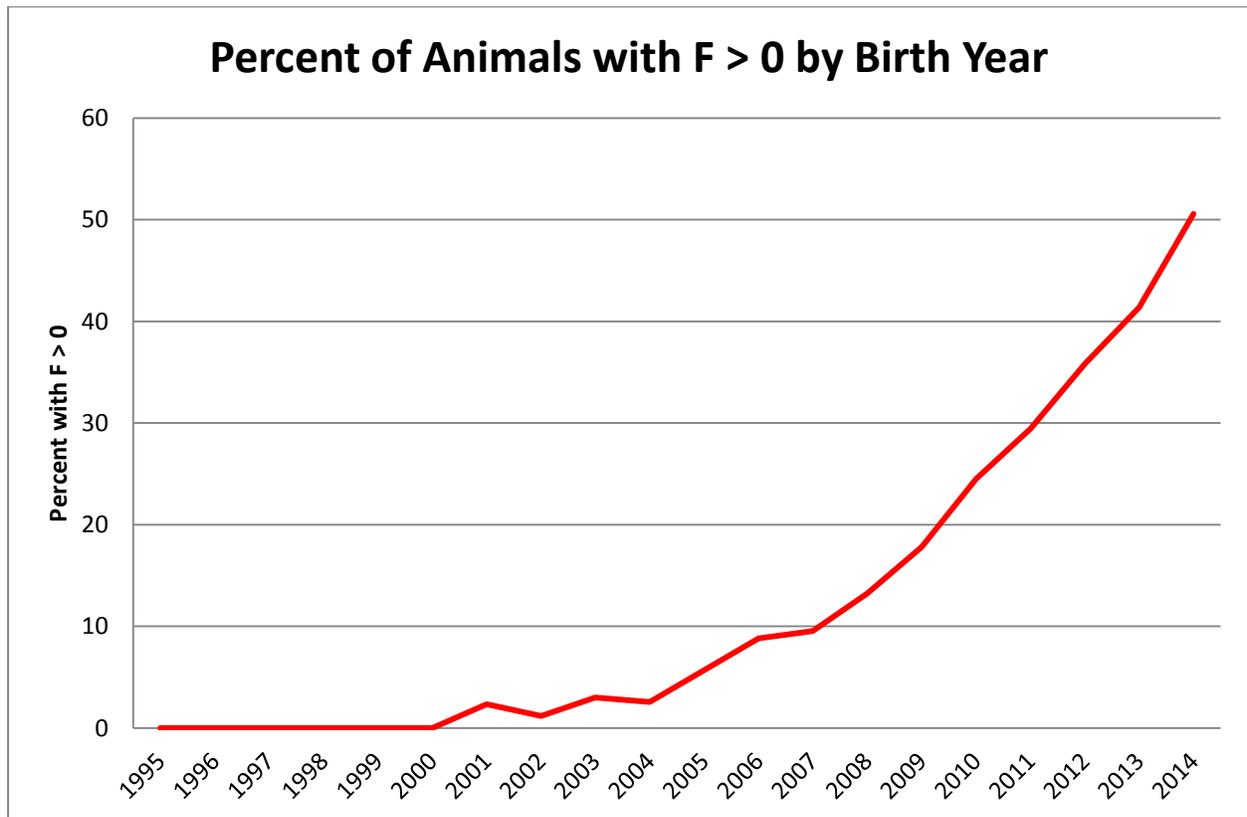
The number of registrations have been steadily increasing, as shown in Figure 2.

Figure 2. Nigerian Dwarf goats registered by birth year



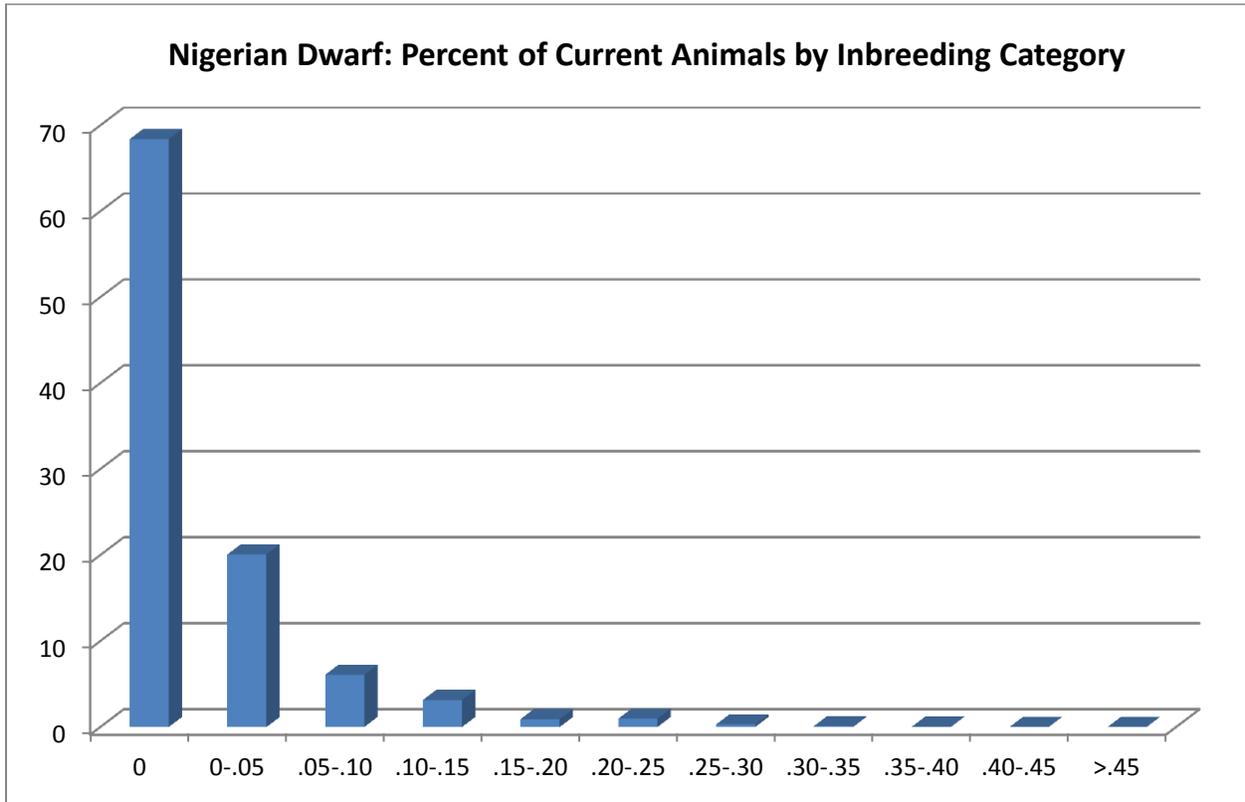
In order to minimize inbreeding accumulation, it is useful to have some animals within the population that are unrelated to the rest of the population. As Figure 3 demonstrates, the Nigerian Dwarf breed has half of the population that is non-inbred. This presents a unique opportunity for strategic mating to prolong this low inbreeding accumulation.

Figure 3. Percent of Nigerian Dwarfs with an inbreeding coefficient greater than zero by birth year



The percentage of current animals by inbreeding category is shown in Figure 4. The current population has an even higher percentage of non-inbred animals than indicated in the overall population (Figure 3).

Figure 4. Percent of Nigerian Dwarfs born 2009 and later by inbreeding category



Due to the low overall pedigree relationship between the goats within the Nigerian Dwarf breed, only 2 clusters were selected. One cluster has a relationship of 9% and the other is 0.5%. As the breed continues to develop, further cluster analyses would be expected to result in more 'families' within the breed, and more clusters. Currently, sampling almost any buck for the repository would be a beneficial addition to the collection.

Figure 5. Tree diagram for Nigerian Dwarf cluster analysis of sires of PB offspring born 2010 and later that are PB themselves (gold line depicts cluster level)

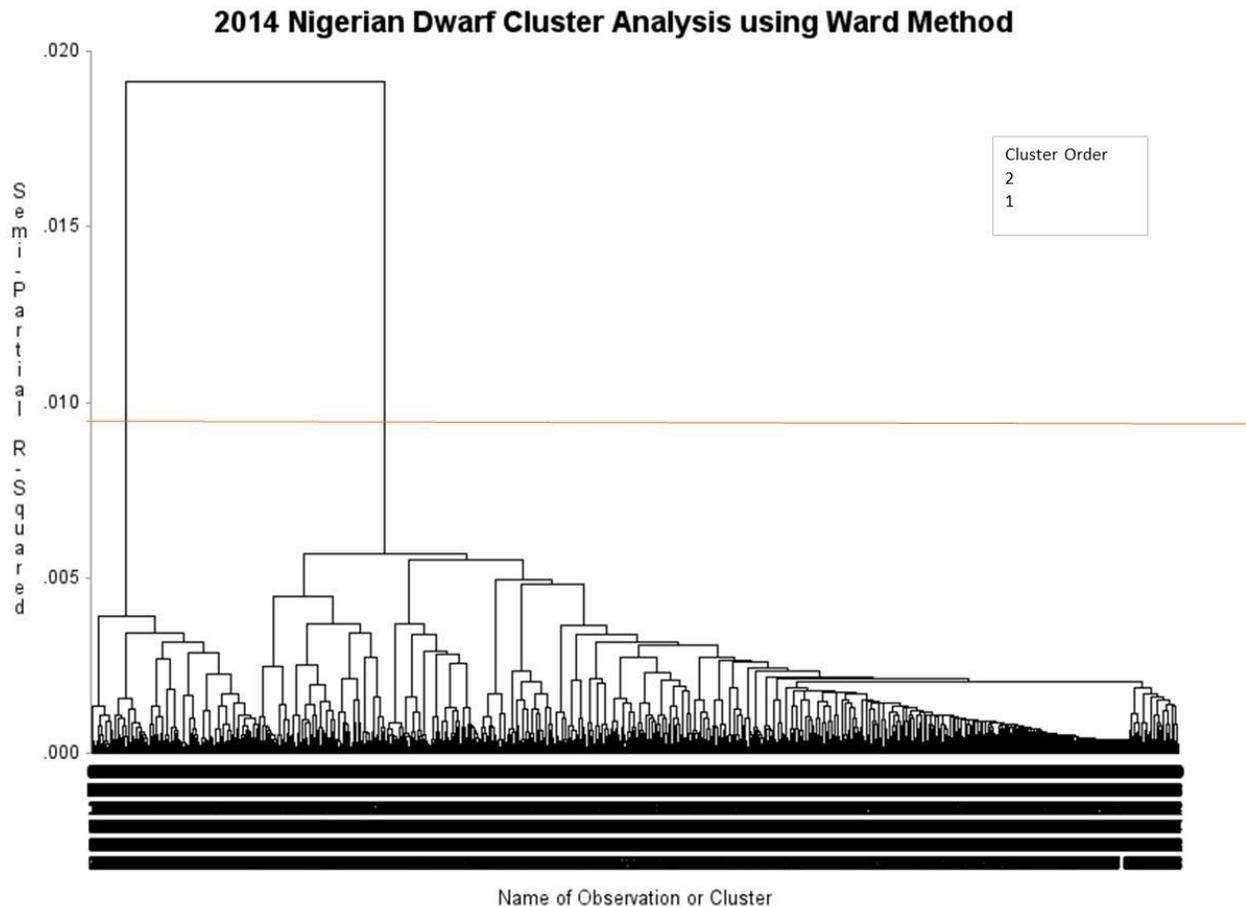


Table 2 shows the clustered animals having an average relationship of 0.008. The table also shows the breakdown of number of bucks by cluster and the relationship mean and variance

Table 2. Nigerian Dwarf cluster results showing the number, mean, and variance for between and within cluster relationships

Between Clusters			
	n	Mean	Variance
	3390	0.008	0.001
Within Cluster			
	n	Mean	Variance
Cluster 1	2866	0.005	0.000
Cluster 2	524	0.090	0.006

Figure 6 shows the within and between cluster relationship matrix. With only two clusters, the only important observation is that the related animals in cluster 2 (n=524) are somehow related to each other and not the rest of the population, which is grouped into cluster 1 (n=2,866).

Figure 6. Within and between cluster relationship matrix for Nigerian Dwarf

	1	2
1	0.005	0.009
2		0.090